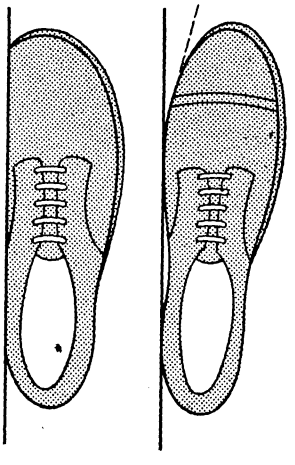
Leather Shoes

SELECTION AND CARE



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Contents

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Leather Shoes . . .

Selection and Care

Shoe Leathers

Leather used in making shoes is of two kinds—bottom, or sole, leather and upper leather. The bottom parts of a shoe, including the outsole, insole, welt, rand, and counter, are cut from bottom leather. The vamp, quarters, toe cap, and tongue—the principal upper parts—are cut from upper leather.

As a rule, the uppers of a pair of shoes last much longer than the bottoms. The outsole and heel always wear out first, chiefly because they bear the brunt of the shoes' burden. Indeed, a pair of shoes made with welts, counters, and insoles of good-quality leather can usually be soled and heeled two or three times before the uppers give out. From the standpoint of wear and upkeep, the bottoms of a pair of shoes are more vital than the uppers.

Sole Leather

Sole leather is made from heavy cattle hides. The leather soles that wear best are cut from the bend portion of the hide. The bend is cut from a side of leather (fig. 1). It is almost rectangular and represents about one-half of the side. It extends from the root of the animal's tail to just back of its shoulder and from the backbone to a nearly parallel line running through the top of the soft spots, or "breaks," at the fore and hind flanks. A bend is about 50 inches long and 25 inches wide, the exact size depending on the size of the hide. Leather from the bend is close-fibered and firm. Soles cut from the belly, the leather from which is soft and flabby, are the poorest from the standpoint of wear. Soles from the bend wear about twice as long as those from the belly and one and one-half times as long as those from the shoulder.

Most sole leather is vegetable-tanned. A mixture of extracts made from wood, bark, and nuts is used for this tannage. The natural color of vegetable-tanned leather varies from

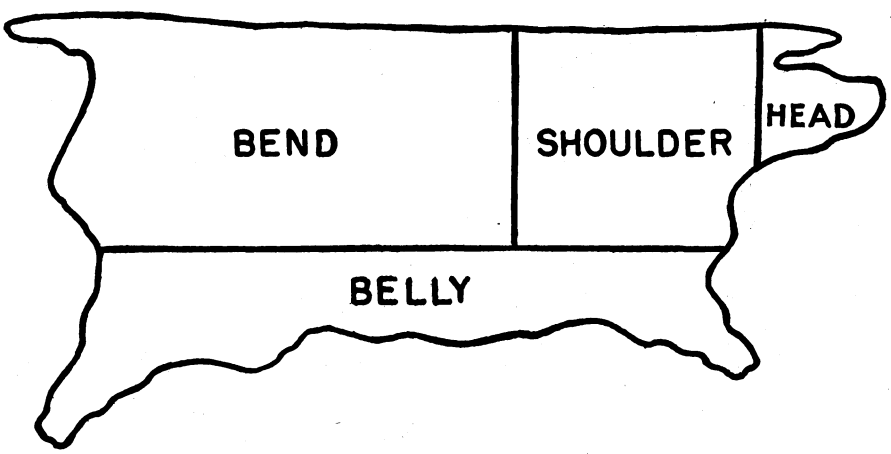

Figure 1.—Sections of a side of leather.

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tan to reddish brown. This leather is usually sold by the pound and is of a specified thickness, measured in irons. (An iron is a trade unit equivalent to one forty-eighth of an inch.) Outsole leather for women's shoes is usually 6 to 8 irons thick, and for men's shoes 8 to 10½ irons thick.

Some sole leather is made by tanning hides and skins with compounds of chromium. Contrary to a common impression, chrome leather is not a

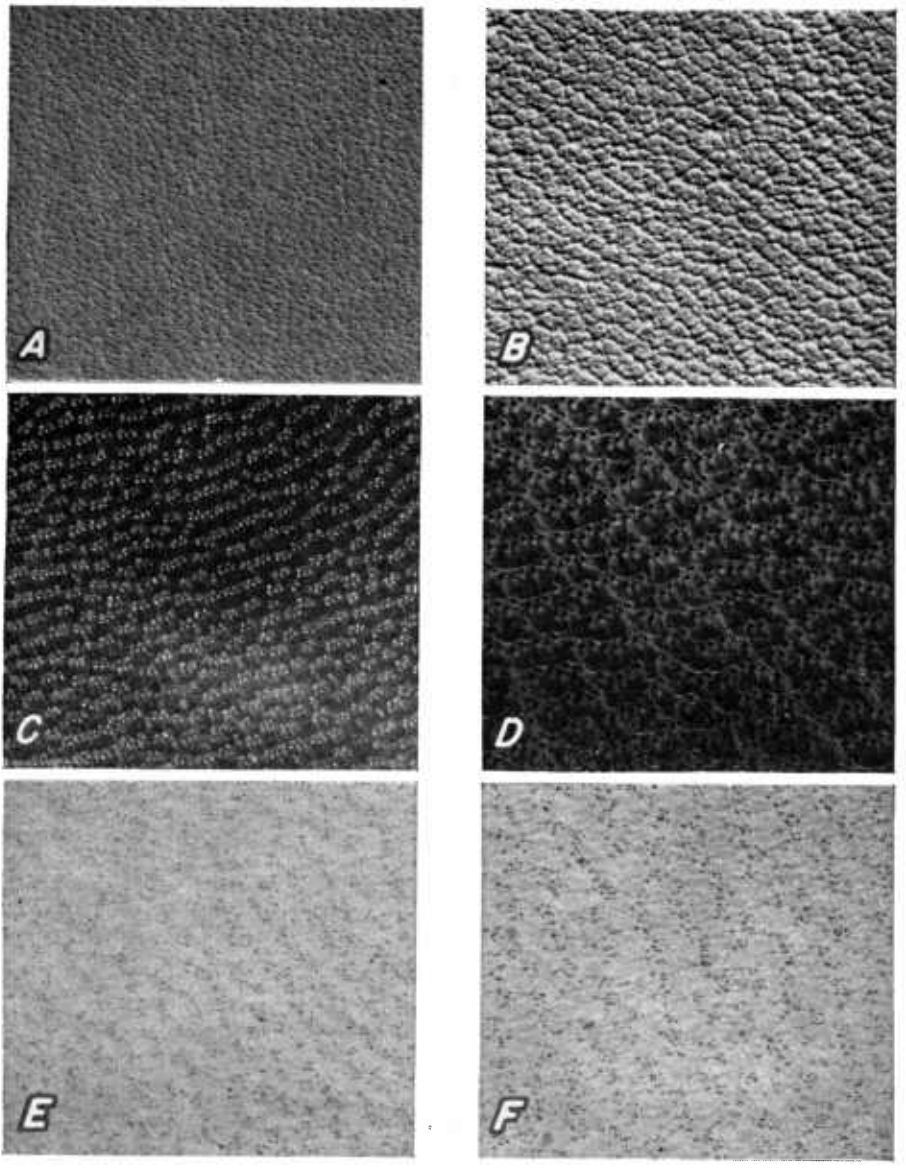

Figure 2.—Natural grain (magnified 5 times) of leathers commonly used for shoes: *A*, Calf; *B*, cowhide; *C*, kidskin; *D*, goatskin; *E*, lambskin; *F*, sheepskin.

leather substitute. In its natural state, chrome sole leather is a light bluish green. Waxed chrome leather, made by filling the leather with waxes and greases, is much darker. Chrome sole leather wears longer than vegetable-tanned sole leather, the natural, or unwaxed, being the longest wearing sole leather made. Unwaxed chrome sole leather, however, is not suited for outdoor wear in wet weather because water passes through it rapidly and it is very slippery when wet. Waxed chrome soles may be stiff at first, but the stiffness usually disappears after the shoes have been worn for a short time. Well-made waxed chrome soles are more than ordinarily durable, which makes them specially desirable for shoes for hard wear. They are too stiff for dress shoes.

In recent years substitute soling materials have been replacing leather soles on shoes. A rubber outsole is used with an all-leather middle sole in many military shoes. The better synthetic materials, in general, have shown greater resistance to wear and to water penetration. They conduct heat and cold better than leather, however, and so are hotter in summer and colder in winter. They do not carry off perspiration as well as leather.

By 1950 nearly half of the soles on shoes of all types were made from synthetic materials. In 1951 the proportion increased somewhat, until at the end of the year leather soles had dropped to 44.9 percent of the total, as compared with 52.0 percent in 1950. It is probable that both leather and synthetic soles will continue to be used in varying quantities, according to their suitability for different uses and to wearers' preferences.

Upper Leather

Trade names for upper leathers are bewildering. They refer more particularly to the grain, nature, and color of the finish, however, than to the kind of skin from which the leather was made. Most hides and skins used for upper leather come from cattle, calves, goats, sheep, and horses. Skins from kangaroos, pigs, and sharks are sometimes used.

Although very little chrome sole leather is now worn, about nine-tenths of all upper leather is chrome-tanned.

Usually the finish is put on the grain or outer surface—also known as the hair side—of the hide or skin, although some upper leathers, like suede and waxed calf, are finished on the flesh side. Thick skins and hides are often split into two or more layers. The layer carrying the grain, or hair side, is a grain split and is made into grain leather. Grain leather, therefore, may or may not be a split. Even when it is a split it is seldom, if ever, referred to as such in the trade, the word "split" being reserved for the underlying layers. Grain leather makes better shoe uppers than do flesh splits.

Grain leather can often be recognized by its feel and general appearance, including the pattern, or grain, formed by fine lines or wrinkles and hair holes, scales, or other markings, depending on the kind of skin from which the leather was made (fig. 2). Sometimes, however, the grain pattern of a certain skin is so cleverly embossed upon a skin of another kind that detection is very difficult.

The back of the human hand, particularly when examined under a slight magnification as with a reading glass, affords an excellent example of a skin pattern, or grain.

Calfskin leather, or calf leather, is made from calfskins, these being defined as skins weighing not more than 15 pounds when green salted. Calf leather is pliable, of fine, smooth texture, and, as it is rarely split, very strong. All things considered, it probably makes the most satisfactory and serviceable upper leather for year-around wear. Much so-called calf leather of today is made from the heavier skins of older animals.

Side leather is made from cattle hides, generally cowhides, split to the desired thickness. The term "side" originated from the practice of cutting

large hides into halves or sides before tanning. Although side leather does not have the natural elasticity, softness, and fine texture of calfskin leather, it makes a very durable upper and is extensively used, particularly for men's and boys' shoes.

Among the smooth-grain finishes for calf leather are dull gun-metal black and a shiny glaze. Leather with a distinct, raised grain obtained by boarding, an operation that slightly puckers the surface, is known as boarded or box calf when finished black and as willow calf when finished in colors. Calf leather with a dull, wax finish on the flesh side is known as wax or dull calf; that with a dull but not waxy finish on the grain side, as mat calf.

Calf leather and side leather finished on the flesh side with a soft, velvety nap are called suede and ooze leather. Buffed leather is finished on the grain side with an emery wheel, which takes off part of the grain surface, leaving a softer finish. It has, however, a much less pronounced nap than suede.

Kid leather is rated among the excellent upper leathers. It is made from the skins of full-grown goats; not, as the name implies, from kidskins. Goatskins are seldom split, except possibly the butts of thick ones. Kid leather has a very fine, clear grain and is closely knit. It is softer and more pliable than calf leather and usually not so thick, for which reason it is not so warm and water resistant. Widely used for high-grade shoes, it is especially good for women's footwear. People with sensitive, tender feet generally find kid uppers more comfortable than calf, particularly in warm weather. Glazed kid is one of the most popular upper leathers. Kid leather is also finished dull, as mat kid. Because of its many desirable features kid leather is often imitated in sheepskin. Hence it is important to examine kid shoes carefully before buying them.

Sheepskin leather is not satisfactory for shoe uppers, because, although very soft, it is loose and stretchy and not durable. Uppers of sheepskin leather soon get out of shape and scuff or peel, particularly at the toes. Sheepskin leather is used extensively for lining shoes.

Cordovan leather, made from the rump of the horsehide, is extremely close in texture, stiff-fibered, and smooth. The finishing process gives it a reddish-brown color. It is probably the most durable of all upper leathers, and, because it is expensive, is frequently imitated. Sometimes leather is sold as cordovan when its only resemblance is the characteristic color. As this leather is fairly heavy, stiff, harsh, and nonporous, it cannot be worn by everybody. Its harshness sometimes causes ripping or cutting of the stitches.

Coltskins and horsehides, finished either dull or glazed, make very durable uppers. They are particularly good for men's shoes.

Kangaroo skins make a soft and fine, but rather expensive, leather, somewhat like that of kidskin of the best quality. This leather is usually considered more resistant to scuffing than kid leather.

Pigskin leather and fancy leathers made from sealskins and skins of reptiles—snake, lizard, and alligator—are used to some extent for upper leather.

Patent leather is made by coating leather with special varnishes or enamels. Most patent leather is made from cattle hides, or side leather. Patent colt, from horsehides and coltskins, is superior in quality. The varnished surface of patent leather gives a finish that for brightness, smoothness, and permanency of gloss cannot be equalled by any other finish. Few manufacturers guarantee that the varnish film will not crack or peel, but patent leather is much better in this respect than it formerly was because of improvements in the processes of making and applying the finish. The film, however, deteriorates with age, losing its flexibility and developing fine checks. The leather is thoroughly stretched before varnishing, so that it has practically no give, and the finish

is nearly airtight and watertight. Consequently patent leather sometimes proves uncomfortable.

Lacquered leathers have been made recently by some tanners, but they have not taken the place of enameled leathers to any great extent, because in luster and depth their finish seldom equals that of patent leather.

Shoe Construction

Most shoes consist of an upper, an insole, and an outsole. In manufacture, the finished upper is drawn tightly over a form, or last, which gives the shoe its final shape, its size, and its style. The means by which the upper is fastened to the insole and the means by which the outsole is fastened to the upper and insole determine the commercial classification of the shoe.

If the upper is fastened to a flat insole with tacks and the outsole is fastened by means of a chain stitch, the shoe is called a McKay shoe.

In making a welt shoe, the upper is first fastened to an insole rib with staples, after which a strip of leather, called welting, is sewed to the insole rib. This fastens welt, upper, and insole together. The outsole is fastened to the welting by a seam which is usually visible near the outside edge of the welting or the bottom of the outsole. If, however, the outsole is fastened with cement instead of a thread seam, the shoe is known as a silhouwelt.

If the upper is permanently fastened to a flat insole with staples or cement and the outsole is fastened with a lock stitch, the shoe is referred to as a Littleway lockstitch shoe.

In the stitchdown process, the welt, upper, lining, midsole if any, and outsole are fastened together with stitching on the outside of the shoe. The finished shoe, upon casual inspection, resembles a welt shoe.

Of all the leather and fabric footwear made in the United States, 25 percent is of welt construction. More than 70 percent of men's boots and shoes are of welt construction, more than 85 percent of women's boots and shoes are of McKay, Littleway, and cement construction. An estimated 75 percent of infants' shoes are made by the stitchdown process.

As a rule, welt shoes give longer service than other types and are easily repaired. Because neither tacks nor stitches go through the insole, welt construction provides a smooth finish inside the shoe.

The McKay shoe is usually lighter in weight and cheaper than the welt shoe. It requires a sock lining to protect the foot from the clinched tacks and stitches in the insole, which otherwise would be in direct contact with the foot. Like the welt shoe, the McKay shoe is easily repaired.

In serviceability, the Littleway shoe is intermediate between the welt and the McKay shoe. Staples, if used to fasten the upper to the insole, do not come through the insole to touch the foot. The lock stitch that fastens the outsole wears longer than the McKay chain stitch. This shoe is repairable.

Many high-quality shoes are made by the cement method. More women's shoes have the outsole fastened by this method than by any other. They are repairable.

Most heels are made from leather, rubber, or wood. Leather heels are built up in layers called "lifts." The top lift is the layer that comes in contact with the ground. It is generally good, firm leather, but the other lifts are often poor leather, compressed leather scraps, or leather substitutes. The height of heels is expressed in eighths of an inch, an 8/8 heel being 1 inch high and an 18/8 heel being 2¼ inches high. The breast is the side of the heel facing toward the toe. The pitch of the heel is the angle at which it is attached to the shoe.

Rubber heels lessen the jar of walking, which makes them particularly popular in cities. As a rule, they wear longer than leather heels, but slip more readily on smooth wet surfaces, such as pavements, slate and metal roofs, trap doors, and car rails.

Wood heels are covered with leather, plastic, or fabric and are provided

with a leather or rubber top lift. As a rule, wood heels are used on women's dress shoes. Wood heels, made in various styles and heights, are known by such names as French heel, Louis heel, and spike heel. The French heel has an hourglass curve; the spike heel has a straight, tapered body.

The breast line of the Cuban heel extends straight up to the outsole; the French, Louis, or spike heel extends into the shank for about ⅝ inch in front of the breast line.

The military heel is similar to the Cuban but is never more than 1¼ inches in height. Spring heels are very low; they are made by placing a wedge of leather between the heel seat of the shoe and the outsole. This type of heel usually appears in children's and infants' shoes.

Shoe Selection

The lasts over which shoes are made are built according to a schedule of standard measurements for the ball, waist, instep, and heel, the schedule being based on the average proportions for normal feet (fig. 3). Sometimes, however, shoes are made on combination lasts, in which the fore part of the shoe may be made to standards that are one-half size larger than those for the heel end of the shoe. These lasts sometimes provide better and more comfortable fitting of the feet than is provided by the usual standard-last schedules.

The size of a shoe is its length, expressed in numbers, and its width, based on girth measurements at ball, waist, and instep, which is expressed in letters. Widths range from AAAAA, the narrowest, to EEEE, the widest. Whole sizes vary by thirds of an inch in length. The American size system runs from 0 to 13½ in a first, or children's, series and continues from 1 on in a second, or adults', series. In the first series, size 0 was originally 4 inches long and size 13½ was 8½ inches long. In the second series, size 1 was originally 8⅔ inches long and size 12 was 12⅓ inches long. Not all shoe

Figure 3.—Where to measure the foot for a shoe.

manufacturers adhere strictly to these lengths. Some have adopted code numbering systems. Shape and fit are better guides to the right shoe than the size stamped on the lining. A certain size of one make or style of shoe may be a correct fit, whereas the same size of another make or style may not.

The service to be required of a pair of shoes is an important factor in selecting them. For example, light-

Figure 4.—Effect of a correctly shaped, well-fitting shoe on the bones of the foot. (Photograph from Army Medical Museum.)

weight street pumps have their own place, but that is not in a farm field or garden.

Unfortunately, the buyer can seldom correctly judge the quality and workmanship of shoes and the kind of leather from which they are made. Cheap shoes are not always an economy, nor are high-priced ones necessarily the wisest investment. Frequently a good share of the high cost goes simply for fancy workmanship and for novelty. About all the buyer can do is to rely on the reputation of the maker or dealer. Any reputable maker will stand back of the goods stamped with his name. Continued satisfaction with shoes can often be had by sticking to the make that has been found correct in design, comfortable in fit, and serviceable, and refusing to buy another pair made by a manufacturer whose wares have been tried and found unsatisfactory.

Although the fitting of shoes requires experience, judgment, and attention to details, many of today's foot ills are the result of lack of thought on the buyer's part. We cannot get around the fact that five toes need a certain space of a certain general shape if they are to spread out naturally and comfortably (fig. 4). When jammed into shoes with needlelike toes, the feet are sure to be cramped, twisted, and finally deformed. Toes are buckled and piled one on another and bones are bent (fig. 5).

A baby does not need shoes until walking time. Shoes put on before

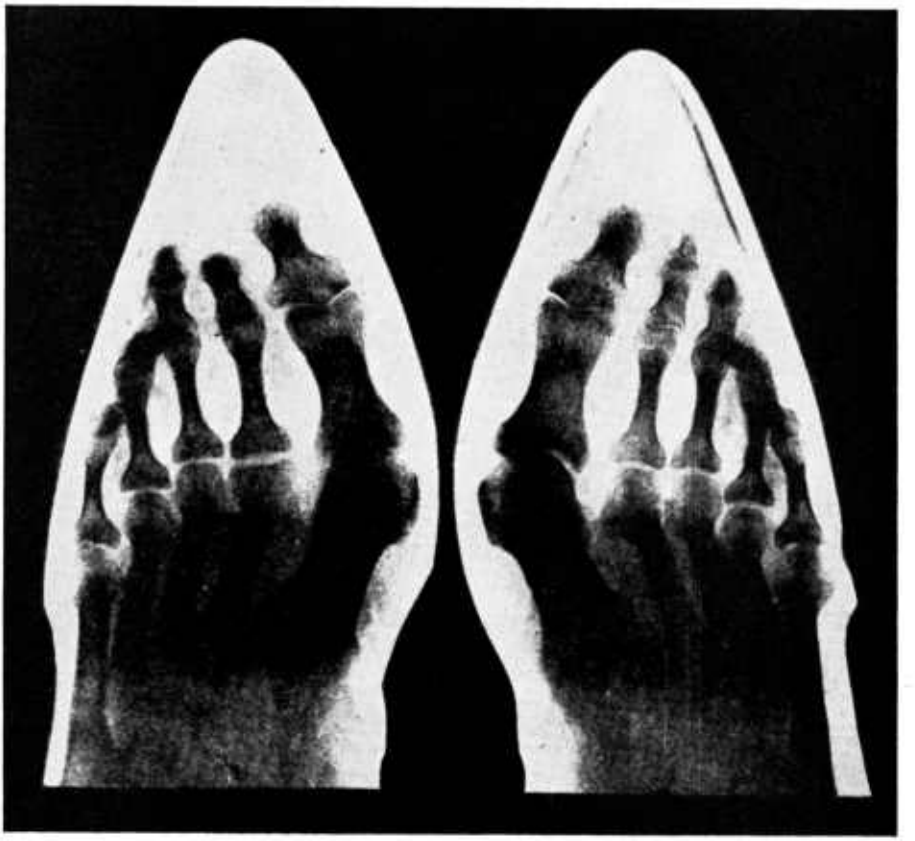

Figure 5.—Effect of an incorrectly shaped, ill-fitting shoe on the bones of the foot. (Photograph from Army Medical Museum.)

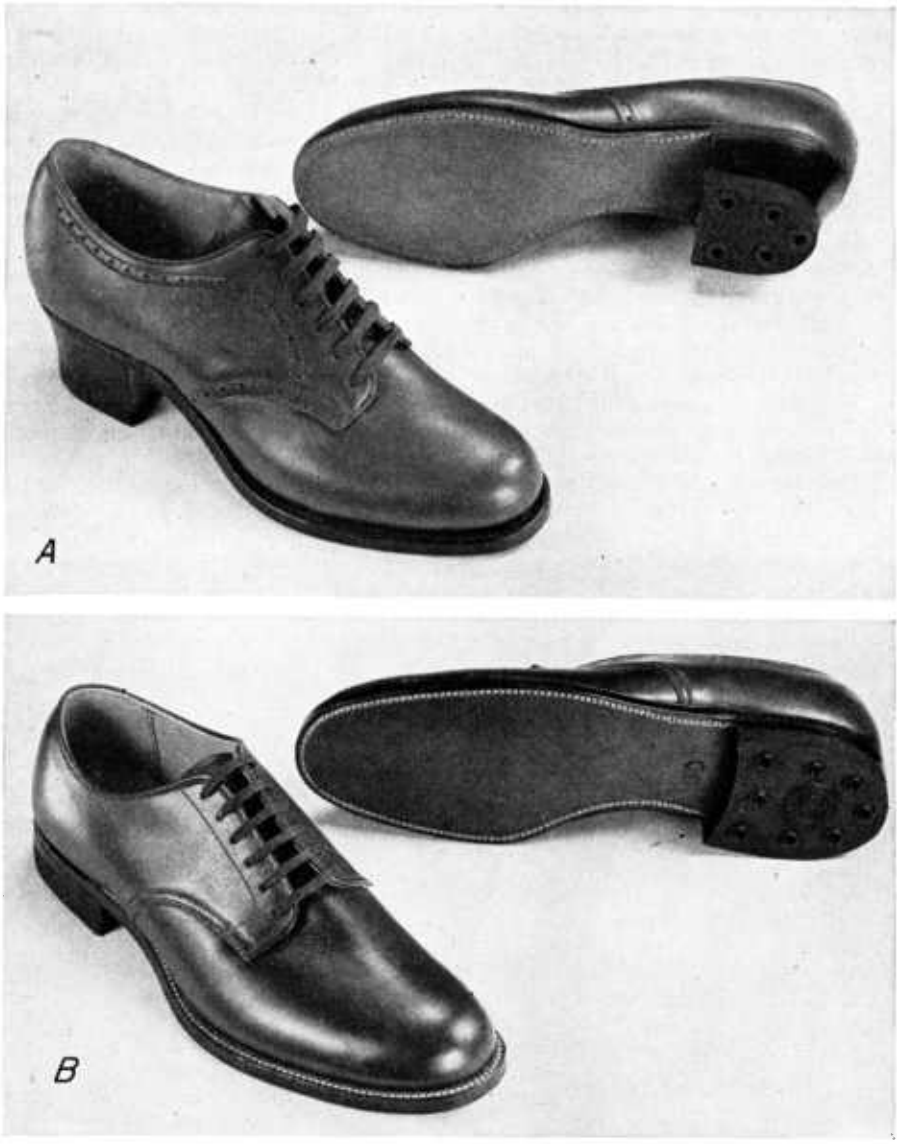

Figure 6.—Military oxford for women (*A*) and for men (*B*). (Photograph from Quartermaster's Depot, U. S. Army, Philadelphia, Pa.)

then, generally for appearance, often do more harm than good. The first walking shoes should have flexible but firm soles, unpolished, preferably slightly buffed, and broad enough to be a steady platform under each foot. Very soft soles curl and make more difficult the baby's task of learning balance. Stiff or boardlike soles also are to be avoided. The toes of the uppers should be full or puffy, not so flat that the leather pulls straight back from the end of the sole and cramps the baby's toes.

Responsibility for the fitting of children's shoes falls on parents,

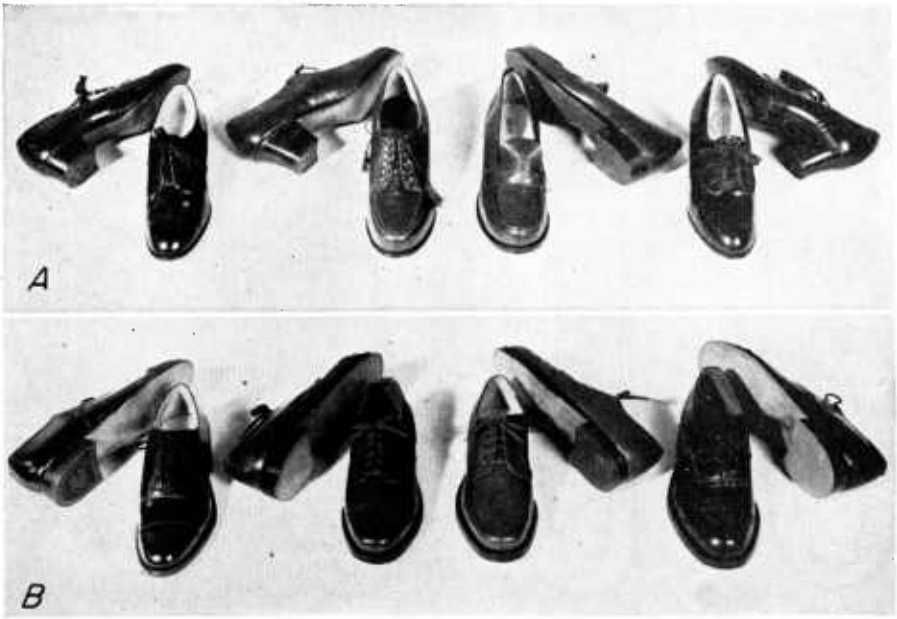

Figure 7.—Shoes of good shape for women (*A*) and for men (*B*). They combine comparatively straight inner lines, rounded toes, medium-high heels, and moderately thick soles, all of which make for serviceability, comfort, and safety.

shoe dealers, and manufacturers. Very young children, of course, cannot judge correctly the design and fit of their shoes. Older children are often willing to sacrifice comfort and money for what they consider a fashionable appearance. The young foot and its bones are easily twisted and bent out of shape by shoes that do not fit. Fortunately, many manufacturers now make children's shoes of correct design.

To be comfortable, safe, durable, and attractive, shoes for everyday wear must conform to the natural shape of the feet and protect them. They must also provide a firm foundation for the body, The military shoe meets these requirements. Proceeding on the theory that an army is only as good as its feet, the Department of the Army has developed several types of shoes built over lasts designed to give correct fit (fig. 6). Many shoes for civilians are being made along the same lines, some, however, from lighter weight materials (fig. 7). They are well adapted for wear in town and country alike.

Shoes of correct shape are broad and round at the toe and straight along the inner edge (fig. 8, *A*, *B*). A pair of normal feet placed together touch at the heels and also from just in back of the big joints of the big toes up to the ends of these toes. The inner edges of the soles of a pair of properly made shoes do likewise. The more the edges diverge or curve toward the outside of the shoe (fig. 8, *C*, *D*), the more unnatural the shoe's shape and the greater the wearer's discomfort. Persistent wearing of such shoes is almost sure to cause enlarged joints and bunions.

Everyday shoes need soles that are at least moderately thick. Often the soles, particularly those of women's shoes, are so thin that walking with

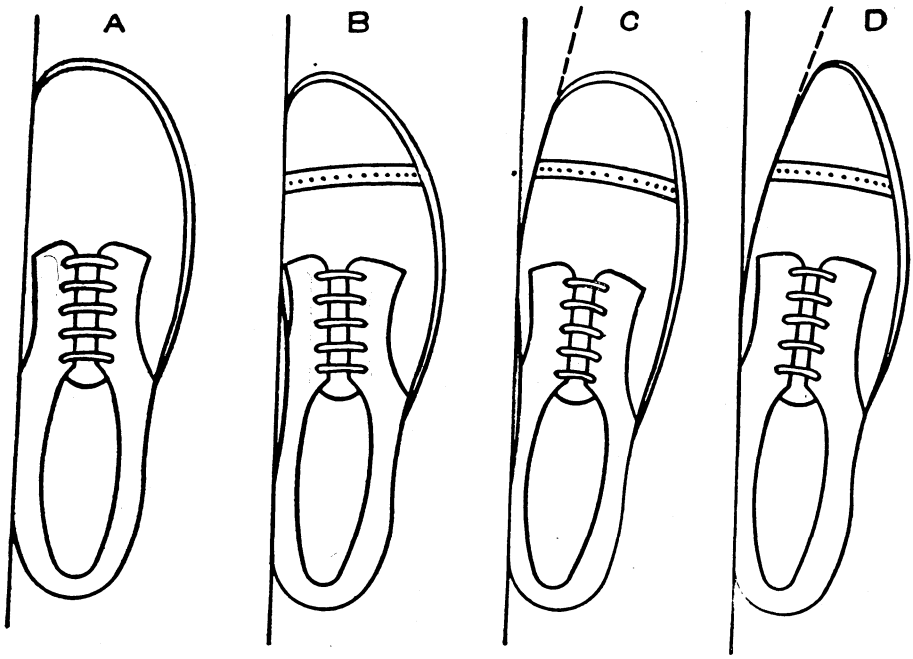

Figure 8.—Shoes made on correct lines (*A*, *B*), with the straight inner line and rounded toe characteristic of the normal foot; and shoes made on incorrect lines (*C*, *D*), with the curve outward from the naturally straight inner line of the foot and also the too pointed toe (*D*). (Photograph from Army Medical Museum).

them on any but the smoothest of surfaces is painful. The feet soon become bruised and calloused. Thicker soles afford more protection to the feet not only against injury from sharp and uneven surfaces, but against water and slush as well. Furthermore, thicker soles last longer.

Heels that are nearly as broad throughout as at the heel seat of the shoe—in other words, taper but little—are best for everyday shoes. Although the height may vary a little with the individual, high heels are frowned upon by most medical authorities. The heel of the Army nurse's shoe is 1⅛ inches high. A sudden change from a high heel to a low one may cause discomfort at first. Such a change should be made gradually to give the feet and body time for adjustment. Failure to realize this has caused many a woman who has constantly worn high heels to think that she cannot possibly wear low ones. The pitch of the heel is also important. Heels that slant too far forward cannot steadily support the body or hold it in its proper posture.

Heels that are too narrow, too high, or incorrectly pitched frequently cause weakened ankles, a wobbly walk, strained muscles, and slipping, twisting, and falling, with serious sprains and injuries at times. The weight is thrown on the toes, and the feet are jammed into the fore part of the shoe, causing bruises, corns, weakened and crushed arches, and bent toes. The evils of high and narrow heels for women and girls, particularly those who are on their feet most of the day, cannot be overemphasized. Such heels also soon run down on one side and frequently gap or pull loose from the shoe. Shoes with high, narrow heels are more readily twisted out of shape than those with low, broad heels, and

are subjected to excessive strain on the seams and to uneven wear on both the soles and uppers.

Shoes should always be fitted with the entire weight of the body on the feet, as the feet are then at their largest. New shoes, if a correct fit, are comfortable from the start. They do not need "breaking in."

The swing, or general direction, of the shoe should be the same as that of the foot; it should not tend to twist the foot out of its normal position. If the swing is not right, the shoe cannot fit correctly. It will be too loose in one place and too tight in another. The one-sided appearance of a worn shoe is usually due to an incorrect swing, which has caused the ball of the foot to rest at one side of the shoe, rather than straight in the middle.

Shoes that fit correctly permit standing, walking, and quick turning in comfort and safety. A normal erect position of the body can be kept in such shoes without undue strain or discomfort. The feet, while snugly supported, are not cramped or crowded, and a firm, full tread is possible.

Shoes that are too small for the wearer are especially harmful when they are too short. During wear a shoe may spread, but it will not lengthen. There should be a good half-inch of empty space beyond the toes in a broad or well-rounded shoe. There should be more space in a more pointed shoe.

Figure 9 shows the principal parts of a shoe. The broadest part should be at the end of the little toe. The big joint of the big toe should come just at the rounding-in of the sole on the inside edge near the instep. This spot is one of the three important bearings of the foot, the corresponding part of the little toe and the heel being the other two. The vamp seam should not press upon the top of the foot back of the toes. Here there should

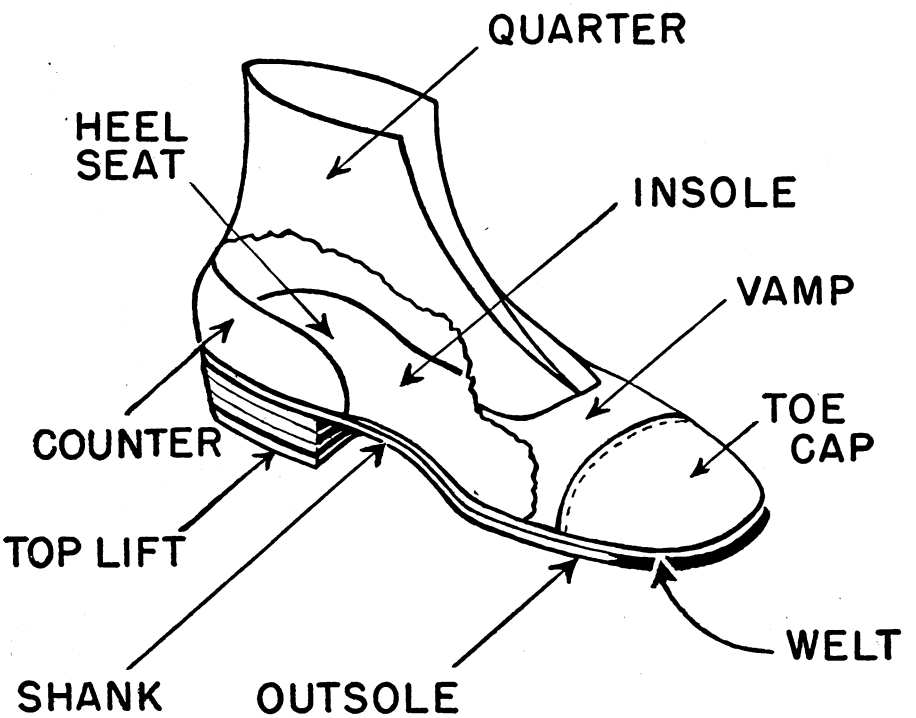

Figure 9.—Principal parts of a shoe.

always be a little, although not much, free space. The counter, which holds the back part of the shoe upper in shape, should center the heel of the foot in the heel seat of the shoe. It should fit the foot snugly and yet be wide enough to be comfortable when the whole weight of the body is borne by the feet for some time. Quarters should not be so full that the edges meet when the shoe is laced. There should be some space between those edges, so that the quarters can hold the foot in place against the back of the shoe. However, the edges of the quarters should not gap so much that the pressure of the laces on the top of the instep will cause soreness.

Shoes that are too large are a misfit. With too much play in the shoe the foot is not supported snugly. Blisters are often formed, especially on the heel, by the rubbing of the foot against the inside of a shoe that is too large. Incidentally, neglect of foot blisters may result in serious infection.

Aside from any consideration of health and comfort, shoes for young and old alike are easier on the family budget if of correct design and fit. They do not soon lose their original shape and they wear longer.

Shoe Care

Correct care of footwear can cut shoe bills drastically.

Shoe trees help keep shoes in their original shape. Paper pads are fairly satisfactory substitutes for trees.

An economical plan is to have two pairs of shoes for alternate daily wear, thus permitting each pair to dry out between times. Perspiration is very hard on leather. Uppers constantly wet with it may soon crack and rip, especially if not protected by occasional oiling.

Mud, water, and excessive dryness ruin leather; oil and grease preserve it. Therefore, the life of boots and shoes may be extended by keeping them clean, pliable, and water resistant. Boots and shoes for farm or other heavy outdoor use need greasing. Those for street wear need polishing only, although the soles may be oiled or greased. Frequent polishing, especially with flexible wax polishes, keeps the leather soft and pliable and gives it a finish that helps to turn water and prevent the collection of dust and dirt. A light, even oiling with a little castor oil on a cheesecloth pad once or twice a month helps to keep patent leather uppers from cracking.

Repairing

It is not necessary to discard shoes as soon as they begin to show signs of wear. After a seam has ripped or the outsole has worn through, shoes often can be repaired and worn for a long time. Good care of shoes includes prompt repair. Down-at-the-heel, dilapidated shoes neither protect the feet nor properly support the body. The minute a seam begins to rip, the upper cracks through, a heel twists out of shape or runs down, or a hole wears through the outsole, the shoe needs mending. If the necessary bit of repairing is put off, the shoe may be so badly worn that it is no longer worth mending, particularly if the welt is worn away or the insole is worn through.

Heels should always be kept squared up. When they begin to run down on one side, both the shoes and the body are put under a strain. The shoes are soon permanently twisted out of their normal position and shape, and the feet, ankles, and legs may be twisted also. Unless the leather or rubber lift on a wood heel is promptly replaced when it wears away, the covering over the wood is cut through and may have to be replaced, sometimes an expensive job because of the difficulty of matching the material in the rest of the shoe.

Ripped seams in the uppers can frequently be stitched at home. A handy person, with the aid of a repair kit, can put on new heel lifts, rubber heels, half soles, and metal heel or toe plates without much difficulty. The equipment necessary for repairing shoes includes a last holder, three or four iron lasts of

different sizes, a shoemaker's hammer, a pair of pincers, one or two leather knives, a leather rasp or file, awls, nails for soles and heels, flax shoe thread, bristles, and wax. These articles, as well as repair kits, are sold by dealers in hardware or shoe findings and by some mail-order houses.

Cleaning, Renovating

Butter, lard, petrolatum, linseed oil, salad oil, and lubricating oil produce ugly stains on light-colored leather. Attempts to remove such stains with gasoline or other ordinary grease solvents may result only in spreading them. These spots can often be successfully removed by coating them with a thick solution of rubber in a solvent that evaporates quickly and then peeling off the rubber coating when it is almost dry, repeating the operation several times if necessary. A solution of finely chopped or shredded unvulcanized rubber (para or Ceylon) in carbon bisulfide, in the proportion of 1 ounce of rubber to 8 fluid ounces of bisulfide, as well as some of the ready-prepared rubber cements, has been found satisfactory for this purpose. The cement must be very thick and dry very fast, and it must contain nothing but rubber and pure solvent. To keep the rubber from sticking too tight, the leather immediately around the stain may be moistened slightly with water just before applying the rubber solution.

Carbon bisulfide should be used only where the ventilation is good, and never near a flame. Its fumes are poisonous and inflammable

All oil or grease spots should be removed as quickly as possible, particularly those made by linseed and other paint oils. These oils oxidize as they dry, so that they are soon only slightly soluble in the ordinary liquid solvents.

Milk spots leather and often leaves a white stain—sometimes a brown stain. Soap and water will remove the white stain, but no way of taking out the brown stain is known. The only feasible thing to do is to dye the leather a shade darker than the stain.

Now and then spots can be removed mechanically by the very delicate manipulation of a sharp edge, such as a safety-razor blade, or with fine emery or crocus cloth. As a rule, this produces at least a slightly noticeable blemish. It may not be as unsightly as the stain, however.

Shoe polish sometimes accumulates on uppers. The appearance of such shoes can often be decidedly improved by cleaning with benzene or gasoline and repolishing.

Uppers with a suedelike finish may become smooth and slick in spots. Often, the nap can be satisfactorily raised with a small wire brush made for the purpose.

Dyeing

Sometimes shoes may be dyed at home with one of the numerous ready-prepared dyes for leather now on the market. Many repair shops also dye shoes.

Some dye preparations contain nitrobenzene, which is recognizable by its penetrating almondlike odor. Such preparations may be entirely satisfactory for dyeing, but, as nitrobenzene is poisonous, they never should be applied to shoes on the feet.

Absorption of nitrobenzene through the feet may cause illness and even death

In applying dye preparations at home it is sometimes helpful to experiment with them on castoff shoes. This gives an idea of the effect and of the best method of application.

Drying

Shoes are easily damaged when wet. Wet leather is soft, so that it readily stretches out of shape and stitches cut through it easily. It wears away rapidly.

Wet shoes must be dried very carefully, for wet leather "burns" much more readily than dry leather. If the leather becomes hotter than the hand can bear, it is almost sure to be ruined. Placing shoes while wet against hot radiators in street cars, against hot steam pipes or stoves, or even in hot ovens spoils them. When dried too fast and without care, shoes shrink and become hard, tight, and out of shape. The sole often cracks and sometimes even falls out in pieces.

The right way to dry shoes is as follows:

First wash off all mud and grit with tepid water. Oil or grease work or rough shoes with one of the preparations described on page 15 or with something similar. Oil street shoes with castor oil. (If the castor oil on a piece of cheesecloth is applied lightly and evenly and well rubbed in, the shoes will take a good shine when dry. If too much oil is used, polishing will be difficult.) Then straighten the counter, heel, vamp, and toe, and stuff the shoes with crumpled paper to keep the shape and hasten drying. Finally set the shoes aside in a place that is not too warm and let them dry slowly.

Never put wet shoes close to a hot stove or radiator, and do not wear them until they are thoroughly dry. It is a good plan to polish street shoes once or twice as soon as they are dry.

Oiling, Greasing

Rational use of suitable oils or greases makes shoes wear much longer than they otherwise would. Shoes worn on farms, in forests, and in mines are helped by oil or grease whenever the leather begins to harden or dry or fails to turn water well. This treatment not only makes them last longer but, when the shoes are well made of good materials, makes them more resistant to water.

Among the best materials for greasing shoes are neat's-foot, cod, and castor oils, tallow, and wool grease, or mixtures of them. Any one may be applied in the following way:

First brush the soles and uppers thoroughly to remove all dust and dirt and then warm the shoes carefully, bearing in mind the danger of burning them if they are wet. Apply the warm oil or grease, which should never be hotter than the hand can bear, with a swab of wool or flannel, and rub it well into the leather, preferably with the palm of the hand. Take special care to work the grease in thoroughly where the sole is fastened to the upper, as water soaks through there most often. Let the greased shoes dry in a warm, but not hot, place.

Water Resistance

Treatment to make footwear resistant to water cannot be expected to keep the feet perfectly dry if the treated shoes are worn for a long time in wet weather; nor will shoes so treated take the place of rubber overshoes or boots for walking in water, slushy snow, or very soft mud. Nevertheless, correctly made shoes given a water-resistant treatment generally protect the feet satisfactorily during rain storms and snow storms, as well as on wet pavements and wet ground where there are no deep puddles. They keep perspiration in, but not to the extent that rubber footwear does.

Grease used to make shoes water resistant in summer should be harder than that used for the purpose in winter. Because heavily greased shoes have a tendency to make feet perspire and swell in hot weather and because there is less need for water-resistant footwear then, it is rarely advisable to put on as much grease in summer and spring as in winter. In summer, the quantity of grease used should not exceed the quantity that the leather will take up without leaving a greasy surface. In winter, a mixture of grease and oil that is not too hard when cold is required. More of it than the leather will take up may be used if greater water resistance is desired.

Treating formulas.—Research on fats, oils, waxes, resins, and other materials

for use in increasing the water resistance of leather, conducted by the Department of the Army, has perfected no procedure for using them, although definite progress is reported. To make shoes water resistant, nothing better than the following simple formulas can be recommended by the Department at this time:

Formula 1

Neutral wool grease	ounces	8
Dark petrolatum	do	4
Paraffin wax	do	4

Formula 2

Petrolatum	pound	1
Beeswax	ounces	2

Formula 3

Petrolatum	ounces	8
Paraffin wax	do	4
Wool grease	do	4
Crude turpentine gum (gum thus)	ounces	2

Formula 4

Tallow	ounces	12
Cod oil	do	4

Melt the ingredients together by warming them carefully and stirring thoroughly. Apply the grease when it is warm, but never hotter than the hand can bear.

Grease thoroughly the edge of the sole and the welt, as this is where shoes leak most, and completely saturate the sole with the grease. This can be done most conveniently by letting the shoes stand for about 15 minutes in a shallow pan containing enough of the melted material to cover the entire sole (fig. 10). Rubber heels, however, should not be put in the grease, because it softens them. To treat the soles of shoes with rubber heels, use a pie pan to hold the melted grease and set the shoes astride the rim of the pan, with the heels outside.

Polishing

Most shoe polishes are mixtures of waxes, colored with dyes and softened to a pasty consistency, usually with turpentine. Others that contain no turpentine are made by boiling mixtures of waxes with a solution of borax or soda, colored with a dye or finely pulverized bone charcoal, and adding either a solution of ordinary soap to form a paste or a solution of castile soap to form a liquid. Some liquid polishes consist of shellac, waxes, and dye in an alcoholic solution.

The notion that shoe polishes containing turpentine are injurious to

Figure 10.—All that is needed for making shoes resistant to water.

Figure 11.—Wiping mildewed shoes with the thick suds of a mild neutral soap, after which they will be wiped with a damp cloth and set out to dry in an airy place.

leather has not been borne out by experiments with several polishes of this kind. Now and then the turpentine becomes rancid, acquiring a sharp, disagreeable odor and making the polish gummy. Such polishes give less satisfactory shines than those in which the turpentine is sweet. Some liquid polishes may contain nitrobenzene, which can be recognized by its almondlike odor. Such preparations may be entirely satisfactory as polishes.

As nitrobenzene is poisonous, however, they never should be applied to shoes on the feet.

Polishes containing free acid or alkali may harm leather. They sometimes cause cracking of the vamp where the shoe is bent most often. Liquid cleaners that contain oxalic acid, frequently put up in combination with paste polishes for use on light-colored shoes, usually injure the leather.

Protection Against Mildew

Shoes kept in a warm, damp, dark place are almost sure to mildew. Mildew probably will not seriously harm the shoes unless it is allowed to remain too long, but it may change their color. The simplest way to prevent mildewing is to keep the shoes in a well-ventilated, dry, light place. When first detected, the mildew should be washed off with soap and warm water (fig. 11), or simply wiped off with a moist cloth, and the leather well dried. The application in the home of preparations designed to prevent mildew is not recommended.

Protection Against Alkaline Substances

Lime, portland cement, lye, and other alkaline substances quickly ruin leather. Shoes worn by workers with such substances will last much longer if kept well greased.

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